

## ABSTRACT OF THE DISCLOSURE

A method for removing from a microelectronic device structure a noble metal residue including at least one metal selected from the group consisting of platinum, palladium, iridium and rhodium, by contacting the microelectronic device structure with a cleaning gas including a reactive halide composition, e.g.,  $\text{XeF}_2$ ,  $\text{SF}_6$ ,  $\text{SiF}_4$ ,  $\text{Si}_2\text{F}_6$  or  $\text{SiF}_3$  and  $\text{SiF}_2$  radicals. The method may be carried out in a batch-cleaning mode, in which fresh charges of cleaning gas are successively introduced to a chamber containing the residue-bearing microelectronic device structure. Each charge is purged from the chamber after reaction with the residue, and the charging/purging is continued until the residue has been at least partially removed to a desired extent. Alternatively, the cleaning gas may be continuously flowed through the chamber containing the microelectronic device structure, until the noble metal residue has been sufficiently removed.